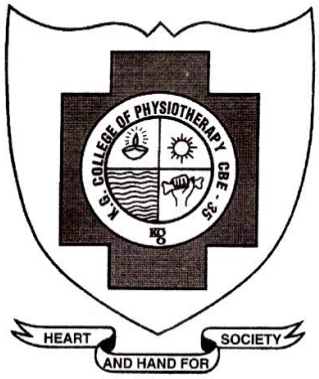
“EFFECT OF SUPERVISED MODERATE INTENSITY EXERCISE WITH FORCED EXPIRATORY TECHNIQUE IN IMPROVING ENDURNCE CAPACTY AND QUALITY OF LIFE IN SUBJECTS WITH CORONARY ARTERY BYPASS GRAFT”



REGISTER NO: 271630183

ELECTIVE: PHYSIOTHERAPY IN CARDIO-RESPIRATORY

A DISSERTATION SUBMITTED TO THE TAMILNADU

Dr. M. G. R MEDICAL UNIVERSITY, CHENNAI.

AS PARTIAL FULFILLMENT OF THE

MASTER OF PHYSIOTHERAPY DEGREE

OCTOBER 2018

CERTIFICATE

Certified that this is the bonafide work of **Mrs. S.PERSIS SELVAMANI** of K.G.College of Physiotherapy, Coimbatore submitted in partial fulfillment of the requirements for Master of Physiotherapy Degree course from the Tamil Nadu Dr. M. G. R Medical University under the **Registration No: 271630183** for the October 2018 Examination.

Date: Principal

Place : Coimbatore

Date :

"EFFECT OF SUPERVISED MODERATE INTENSITY EXERCISE WITH FORCED EXPIRATORY TECHNIQUE IN IMPROVING ENDURNCE CAPACTY AND QUALITY OF LIFE IN SUBJECTS WITH CORONARY ARTERY BYPASS GRAFT"

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Has been submitted in partial fulfillment for the requirement of the

MASTER OF PHYSIOTHERAPY degree,

October 2018

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External examiner

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INTRODUCTION

Coronary artery disease is one of the frequent illness affecting general population all over the world. It is the leading cause of mortality. The coronary artery disease accounts for approximately 50% of cardiovascular disease deaths. The incidence of coronary artery disease is three times greater in men when compared to women. The ratios of 1:20 persons suffer from coronary artery disease according to American Heart Association.

It commonly occurs in the age group between 35 – 65 years. In India, males are more prone to Coronary artery disease due to smoking and life style behaviors. The male and female ratio is 4:1 persons. The coronary artery disease is likely to cause increased death rate by 2.4 million in 2020.

The high resting rate and systolic blood pressure indirectly implies on cardiovascular disease and increases the mortality rate. The narrowing lumen of the coronary artery is due to the formation of atherosclerosis plaque. It progresses and leads to complete occlusion. The pathological process leads to imbalance between myocardial oxygen supply and demand. The coronary artery disease present with angina, heart failure or sudden death.

The risk factors of coronary artery disease are lipid disorder (increase in LDL and decrease in HDL), hypertension, obesity, smoking, reduced physical

activity, diabetes, alcohol consumption. Modification of life style behavior such as cessation of smoking, proper dietary intake, physical inactivity can significantly reduces the risk of Coronary artery disease.

The Coronary artery disease is treated by drug therapy and in some cases revascularization is necessary. The two methods of revascularization are percutaneous trans-luminal coronary angioplasty and Coronary artery bypass graft. Coronary artery bypass graft is the commonest surgery for multiple blocks in coronary artery.

The narrowed segment of the artery is bypassed by a graft taken from saphenous vein or internal mammary artery. The patency of the coronary artery bypass graft is done by anti-platelet therapy and lipid lowering drugs. Post-operative cardio respiratory impairment may occur. Coronary artery bypass graft surgery prolongs the life and quality of life in coronary artery disease patients.

Cardiac rehabilitation is a valuable non-pharmacological intervention to improve cardio respiratory fitness and overall health status in patients with Coronary artery disease. The programmed cardiac rehabilitation for post coronary bypass graft patients help to restore their optional physiological, psychological, vocational and educational status. Cardiac rehabilitation has an important part in reducing mortality rate by 26% compared standard medical care. The goals of

these programs are to prevent the deleterious effect of prolonged bed rest after surgery, to enhance cardiac function, risk factor modifications, improve physical activities and self-confidence in these patients.

Cardiac rehabilitation is given as an individualized program, considering all the principles of training (mode, frequency, intensity and duration). Among these principles exercise intensity is the most important in the cardiac rehabilitation. Exercise intensity is determined by percentage of heart rate maximum (55-90%) for subjects in cardiac rehabilitation. Exercise training is effective in the improvement of functional capacity, reduction in risk factors and mortality rate in post-operative coronary artery bypass graft patients.

The post coronary artery bypass graft surgery is more effective with individualized cardiac rehabilitation program which improves speed of recovery and quality of life. The prognosis of the Coronary artery bypass graft surgery is improved after aerobic exercise training. After aerobic exercise training, functional capacity in these patients is also found increased to the maximum.

The conventional physiotherapy treatment which are given to a post-operative coronary bypass graft patients consists of early mobilization, range of motion exercises and breathing exercises.

Moderate intensity program puts you at an approximately 50-65% of your maximum heart rate[THR= RHR+ 40-59% of (MHR-RHR)]. In this exercise program patient may breathe harder and might perspire, but they won't be panting and soaking wet, after an exercise session. So, during this moderate intensity exercise program continuous supervision of the patient is very much needed. Physiotherapist who is supervising the patient should continuously monitor patient's blood pressure (BP) and their SPO2 values. If the therapist sees any alterations in the patient's vitals, cessation of the exercise program should be done immediately.

Forced expiratory technique has been developed to optimize expiratory flow and promote airway clearance. This technique sometimes reffered to as a 'huff', is used to help force secretions (phlegm) up the throat so it can be removed via the mouth without the pain of coughing.

1.1 NEED FOR THE STUDY :

The coronary artery bypass graft subjects who were included in the cardiac rehabilitation program has significantly low incidence of major adverse cardiac events. Supervised moderate intensity exercise program is said to reduce the length of the hospital stay and quicken the cardiac

rehabilitation process, thereby improving the quality of life of the post-operative Coronary artery bypass graft patients.

The forced expiratory technique is used to help force secretions (phlegm) up the throat, so it can be removed via the mouth without the pain of coughing. Benefits of an Forced Expiratory technique are, they are less painful than coughing, less tiring than coughing and has less effect on pressure inside the skull than coughing. This technique helps in reducing the breathlessness and improving the endurance capacity of the patient. Together with the moderate intensity exercise program this technique helps in improving the quality of life of the post-operative Coronary artery bypass patients.

1.1 **PURPOSE OF THE STUDY**:

The purpose of this study is to see the effect of supervised moderate intensity exercise program with forced expiratory technique in patients who have underwent Coronary Bypass Graft surgery.

1.2 KEYWORDS :

Coronary artery bypass graft, supervised moderate intensity exercise and forced expiratory technique.

1.3 OBJECTIVE OF THE STUDY:

- To find the effectiveness of the conventional therapy in Coronary artery bypass graft subjects.
- To find the effectiveness of supervised moderate intensity exercise program in Coronary artery bypass graft subjects.
- To find the effectiveness of supervised moderate intensity exercise program with forced expiratory training in Coronary artery bypass graft subjects.

1.4 HYPOTHESIS:

NULL HYPOTHESIS:

There is no significant difference between conventional therapy and supervised moderate intensity exercise program with forced expiratory technique in improving the endurance capacity and quality of life in subjects with Coronary artery bypass graft.

ALTERNATE HYPOTHESIS:

There is a significant difference between conventional therapy and supervised moderate intensity exercise program with forced expiratory technique in improving endurance capacity and quality of life in subjects with Coronary artery bypass graft.

REVIEW OF LITERATURE

American heart association guideline 2008

The guideline found during the past two decades, major advances have occurred in diagnostic techniques, the understanding of natural history, and interventional cardiology and surgical procedures for patients with valvular heart disease. These advances have resulted in enhanced diagnosis, more scientific selection of patients for surgery or catheter-based intervention versus medical management, and increased survival of patients with these disorders.

Robert H Jones et al., (1996)

They conducted a study to evaluate the long term survival in CABG and PTCA in coronary artery patients. 9268 patients were included in this study, 2449 were treated with medicine and 2929 with angioplasty, 3890 with CABG. The outcome measure was severity of coronary artery stenosis. It was concluded that maximal survival benefit occurs in triple vessel disease from CABG surgery.

Takashi. Hirotani et al., (1999)

They conducted a study to assess the use of internal mammary artery for Coronary artery bypass graft and survival rate in diabetic patients after surgery. A total of 420 patients were included in the study. Among 420 patients, 164 were

non-diabetic and 155 patients were diabetic. Based on the results it was concluded that internal mammary artery had greater survival rate in diabetic patients.

Kathron M et al.,(1999)

They conducted a study to find out the relationship between physical activity and coronary artery disease among high risk women. 39372 subjects were included in this study and they were followed from 1992 to 1999. Coronary artery disease is correlated with energy expenditure for all activities. It was concluded that even light and moderate activities were associated with lowering the risks of coronary disease in women.

Jeroen J Bax et al., (1999)

They conducted a study to analyze the long term effects of revascularization. 68 patients were assessed by echocardiography before and after revascularization. They concluded that there was improvement in left ventricular ejection and New York Heart Association functional class after revascularization.

Hans Tygesen et al., (2001)

They conducted a study to find the effect of intensive exercise in cardiac rehabilitation in coronary artery bypass graft and myocardial infarction patients. A

total of 62 patients were included in the study and underwent 3 months of exercise training. They concluded that cardiac rehabilitation improves exercise capacity.

Viswanathan Mohan et al., (2001)

They conducted a study to evaluate the prevalence and risk factors of coronary artery disease in urban south Indian population. The study was conducted at two areas in Chennai. 1399 subjects participated in this study. All subjects underwent three laboratory investigations of cholesterol profile, glucose tolerance and ECG. Diagnosis of coronary artery disease was based on these tests and previous medical history. It was concluded that there was a high prevalence of coronary artery disease in urban south Indian population.

Yoshihiro Akashi et al., (2003)

They conducted a study to evaluate the effects of moderate intensity training on exercise capacity and vasodilator capacity in post cardiac event patients. 21 patients underwent two weeks of training. Blood pressure, respiratory gas analysis, cardiac outflow were measured during the exercise test. Results showed that moderate intensity training improved exercise tolerance and vasodilator capacity in post cardiac event patients.

B. Vagaggini et al., (2003)

They conducted a study to evaluate the effects of six minute walk test and shuttle walk test, which will be used for assessment of exercise capacity as well as outcome measures in cardiac rehabilitation patients. Six minute walk test is a self-paced test.it is said to be reliable, safe and inexpensive. They concluded that both six minute walk test and shuttle walk test induces a similar cardio-respiratory performance in cardiac rehabilitation patients.

Jerilyn K.Allen et al., (2004)

They conducted a study to evaluate the functional status of patients after CABG and PTCA for one year during recovery. The study consisted of 2 groups, 106 patients in CABG group and 64 patients in PTCA group. Functional status was evaluated by activities of daily living, work performance, social activity, mental health and quality of social interaction at 1, 6and 12 months interval. The results showed that the work performance and psychological functioning improved significantly in the CABG group.

Shyi Kuen WA et al., (2005)

They conducted a study to evaluate the effect of cardiac rehabilitation in post CABG patients. A total of 22 patients were included in the study. The study

consisted of 2 groups, a cardiac rehabilitation group and a control group. 11 patients were allotted in each group. The resting heart rate was measured. Cardiac rehabilitation group received 36 exercise sessions for three times a week. Results showed that cardiac rehabilitation group had significantly lower resting heart rate than the control group.

Farzaneh Taghian et al.,(2006)

They conducted a study to analyze the effects of cardiac rehabilitation in post cardiac surgery patients. 32 patients were included in the study and underwent two months of exercise training. The functional capacity was assessed by six minute walk test. They concluded that there was improvement in functional capacity and also six minute walk test was easy and safe for post cardiac surgery patients.

Yi Wen lin et al.,(2006)

They conducted a study to evaluate the effects of cardiac rehabilitation and home based exercise training on heart rate recovery in post CABG patients. In a total of 54 patients, 18 in the cardiac rehabilitation and 18 in the home based exercise group and 18 in the control group. The patients received 12 weeks of training. It was concluded that cardiac rehabilitation program had a positive effect on heart rate recovery in post CABG patients.

Claudia Fiorina et al.,(2007)

They conducted a study to evaluate the feasibility of six minute walk test as a measure of cardiac rehabilitation program in post-surgical patients. In this study 348 patients were included in this study and six minute walk test was taken before and after the training. Results showed that there was no relationship associated with gender, age, comorbidities and they were independently associated with six minute walk test. The distance was significantly increased in these patients. The six minute walk test was feasible and well tolerated by adult and older patients shortly after cardiac surgery.

Terance Kavanagh et al.,(2008)

They conducted a study on walking distance versus peak oxygen uptake to predict the prognosis of CABG and MI patients. The 12 months waking training was given and followed. Peak oxygen uptake and walking distance were measured. On the basis of study findings it was concluded that subjects who underwent exercise rehabilitation program showed improvement in walking distance. It was a strong independent predictor of peak oxygen uptake.

J C Busch et al., (2008)

They conducted a study to investigate the effects of standard exercise training versus functional training in post CABG patients. A total of 121 patients were included in the study. Among the 121 patients, 57 were in the functional group, 64 in the standard exercise training group. The training was given for 6 weeks period of time. The six minute walk distance and quality of life questionnaire as recorded before and after the training program. The six minute walk test distance and quality of life was improved in both the groups.

Stefan Hofer et al.,(2009)

They conducted a study to evaluate the effects of cardiac rehabilitation in improving the quality of life in patients with post coronary artery bypass surgery. 487 patients were included in the cardiac rehabilitation and trained for 1 month duration. It was concluded that there was an improvement in the health related quality of life in post CABG patients who underwent cardiac rehabilitation program.

Ramin Shabani ET AL., (2010)

They conducted a study to investigate the effect of cardiac rehabilitation program in improving the exercise capacity in post CABG women. A total of 60

female subjects were included in the study. 30 women both in experimental and in control group were assigned randomly. The functional capacity f he subject was evaluated with six minute walk test and exercise test during pre and post training session. The 12 weeks of exercise training showed improvement in exercise capacity and six minute walk distance. It was concluded that women undergoing cardiac rehabilitation had improvements in exercise duration time, six minute walk distance, rate pressure product and supply of oxygen to the cardiac muscles.

Mridha et al., (2011)

Stated that peak expiratory flow rate (PEFR) is the maximal expiratory flow rate sustained by a subject for at least 10 milliseconds expressed in Litre per minute (L/min). PEFR is a simple, reliable reproducible and easily measurable ventilator lung function test. This simple test has been measured by various types and shapes of instruments. For a long time since, now mini-w=Wright peak flow meter is widely used to measure the PEFR values. Mini- Wright peak flow meter is cheap, easily portable and reproducible device for PEFR even below the age 5 years.

Douma et al., (1992)

Suggested that peak expiratory flow rate (PEFR) is often used to assess bronchial obstruction. In the present study, we tested the reliability of peak expiratory flow (PEF) values measured with mini- Wright peak expiatory flow

meters that has been used frequently for 5 years. The values obtained with these meters were compared with value measured with identical but new meters in 50 patients with obstruction airway diseases. They concluded that mean peak expiratory flow value measured with frequently used mini-Wright peak expiratory flow meters are still reliable after 5 years. In long tern studies, IT was suggested that renewal of peak expiratory flow meters restricted to cases of malfunction.

Dekker at al., (1992)

They conducted a study to analyze the validity of peak expiratory flow measurement in assessing the reversibility of airflow obstruction. Peak expiratory flow rate (PEFR) measurements were performed (mini-wright peak flow meter) in 73 general practice patients (aged 40-84) with a history of asthma or chronic lung disease before and after inhalation of 400 micrograms of salbutamol. The change in peak expiratory flow was compared with the change in forced expiratory volume in one second (FEV1) and it was concluded that absolute changes in peak expiratory flow rate (PEFR) could be used as a simple technique to diagnose reversible airflow obstruction in patients from general practice.

Lebowitz (1991)

Stated that the use of peak expiratory flow rate measurements in respiratory diseases. Peak expiratory flow rate is easily measured and its values are reduced in

obstructive diseases. The variety of durable, inexpensive devices for measuring peak expiratory flow rate makes it a valuable tool for monitoring airways diseases.

Hughes and Empay (1981)

Stated that decreased bronchomotor tone would lead to a fall in airway resistance and hence increases flow rate of air along it. Test of peak expiratory flow rate (PEFR) reflect the changes in airway callibre's and make it particularly suitable for epidemiological studies of respiratory function.

Cristina Opasich et al., 2004

The author recommend that soon after a cardiac surgery procedure, a patient is prescribed an individual rehabilitation program based on his or her demographic, clinical, psychological, and functional variables. In this perspective, early execution of the 6-min walking test (6MWT) can be useful. The 6-min walking test is a practical, simple test, which requires only the ability to walk; its use can be extended to frail and limited patients. The distance that a patient can walk on a flat surface in a period of 6 min may be used either as a generic one-time measure of functional status or as an outcome measure for the rehabilitation program. The results of the 6-min walking test are generally interpreted as a percentage of predicted values in healthy subjects. However, a correct interpretation of the 6-min walking test in a given patient can only be achieved by comparing that patient's 6-min walking test performance with appropriate reference values for the specific

population from which the patient comes: the higher the affinity of the patient with the reference population, the lower the risk of approximation in the interpretation.

Charlotte Urell et al., 2012

The study states Lung function was decreased by approximately 50% and the postoperative lung volumes were less than 40% of predictive values on the second postoperative day of open-heart surgery. Expressed as percent of predicted, younger patients had lower postoperative vital capacity than older patients, males had lower postoperative inspiratory capacity than females, and patients with a high BMI had lower postoperative inspiratory capacity than normal weight patients. There was an association between more pain and more pronounced decreases in lung volumes postoperatively. One reason that younger patients seem to be more affected by surgery could be that they normally may use a greater range of motion in thorax during breathing compared to older ones. Another reason might be pain, as younger patients rate more pain from the sternotomy than older ones. Though males had lower inspiratory capacity (expressed as % pred.) compared to females this was probably not harmful because the values in liter were higher for males.

METHODOLOGY

3.1. STUDY DESIGN

Two group Pre - test and Post - test experimental study design.

3.2. STUDY SETTING

Study was conducted at the Department of cardiology and Department of Physiotherapy, KG Hospital, Coimbatore.

3.3. STUDY SAMPLING

Based on selection criteria, thirty subjects were selected and they were allotted into 2 groups by simple random sampling method with 15 subjects in each group.

Group A – Control group

Subjects received conventional exercise therapy.

Group B – Experimental group

Subjects received supervised minimal intensity exercise along with forced expiratory technique.

3.4. STUDY DURATION

The study was conducted for a period of 4 months.

3.5. SELECTION CRITERIA

INCLUSION CRITERIA:

- Both male and female were included.
- Age group between 45-55 years.
- Subjects who underwent triple vessel coronary artery bypass surgery.
- Subjects who underwent coronary artery bypass surgery for the first time.
- Subjects who are willing to participate in the study.

EXCLUSION CRITERIA:

- Subjects with acute episodes of myocardial infarction.
- Subjects who have any orthopeadic or neurological problems.
- Subjects who have any complications after an coronary artery bypass surgery were excluded from the study.
- Those who are unwilling to co-operate.

3.6. VARIABLES

- **Independent Variable**
    - Supervised moderate intensity exercise
    - Conventional exercise therapy
    - Forced expiratory technique
- **Dependent Variable**
    - Endurance capacity
    - Quality of life

3.7. PARAMETERS

- Endurance capacity
- Quality of life

3.8. OUTCOME MEASURES

- Peak expiratory flow rate
- Six minute walk test
- SF-36 questionnaire

3.9. ORIENTATION OF SUBJECTS

The subjects were explained regarding the study and procedure and they were asked to feel free to tell if they had any kind of discomfort during the course of the treatment. All the willing patients were asked to sign the consent form before the treatment.

3.10. PROCEDURE

All the subjects with post-operative coronary artery bypass surgery who satisfied the inclusion and exclusion criteria were selected for this study. A clear explanation of the study was given to the subjects and written consent was obtained.

Based on selection criteria, thirty subjects were selected and they were allotted into 2 groups by simple random sampling method with 15 subjects in each group.

Group A- Subjects received conventional exercise therapy.

Group B- Subjects received supervised minimal intensity exercise along with forced expiratory technique.

The pre-test values were taken to measure endurance capacity using six minute walk test and peak expiratory flow rate and quality of life using the sf-36 questionnaire. All subjects had one orientation session about the forced expiratory

technique and its uses. The exercise training consists of a warm up phase, an exercise phase and a cool down phase. After a brief warm up which consist of breathing exercise and mild relaxing exercise of trunk and shoulder, subjects were instructed to do forced expiratory techniques and progressively continue with supervised minimal intensity exercise program. The pulse oxy-meter was kept ready in order to measure the heart rate and Spo_2 values during treatment.

GROUP A

CONTROL GROUP

Warm up phase:

Subjects were given a warm up period for 10 minutes (50% of HR max)

Exercise phase:

The intensity of the exercise was increased to the target intensity of the subjects for 30 minutes (Resting heart rate + 30)

Cool down phase:

Subjects were given cool down period of 10 minutes (50% of HR max)

GROUP B

EXPERIMENTAL GROUP

Warm up phase:

Subjects were given warm up exercises for 10 minutes (50% HR max)

Exercise phase:

The forced expiratory exercise was given followed by the supervised moderate intensity exercise. The intensity of the exercise was increased to the target intensity according to,

THR= Resting heart rate + 40-59% of (MHR- RHR)

Warm up phase:

Subjects were given a cool down period for 10 minutes (50% of HR max)

The exercise program was carried out for the duration of 4 months at a frequency of 3 times a day for 7 days after surgery and then 4 times a week for 15 weeks. The pre-test values were taken prior to the surgery and the post-test values were taken after the exercise training. The pre-test and post-test data were analyzed statistically. All safety equipment's and drug needed for stabilizing of cardio respiratory parameter in case of emergency was made readily available.

3.11. STATISTICAL TOOL

The following statistical tools were used to analyze peak expiratory flow rate, six minute walk test and SF-36 questionnaire in patients who have underwent coronary artery bypass graft. The paired 't' test was used to compare the pre and post-test values for Group A & B.

Formula: Paired t-test

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

Where,

d = difference between the pre test versus post test

$\bar{d}$ = mean difference

n = total number of subjects

S = standard deviation

Unpaired ‘t’ test:

The unpaired ‘t’ test was used to compare the pre-test and post-test values between the two groups.

Formula: Unpaired t-test

$$S = \sqrt{\frac{\sum\left(X_1 - \overline{X_1}\right)^2 + \sum\left(X_2 - \overline{X_2}\right)^2}{n_1 + n_2 - 2}}$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{S}\sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

Where,

$\overline{x_1}$ = Mean of Group A

$\overline{x_2}$ = Mean of Group B

$\sum$ = sum of the value

n_1 = number of subjects in Group A

n2 = number of subjects in Group B

S = combined standard deviation.

IV. DATA ANALYSIS AND INTERPRETATION

TABLE – I

PAIRED "t" TEST – SIX MINUTE WALK TEST

GROUP A – CONVENTIONAL THERAPY

PRE AND POST TREATMENT VALUES OF GROUP A

S.NO	GROUP A	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	203.8	3.6	20.20	18.14
2.	POST-TEST	223.9	3.2		

Using paired "t" test with 5% as level of significance, the calculated "t" value 18.14 which is greater than the table "t" value 2.15. This test showed that there is significant effect of conventional therapy in six minute walk test for patients who have underwent coronary artery bypass graft surgery.

SIX MINUTE WALK TEST

GRAPH - 1

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP A (CONTROL GROUP)

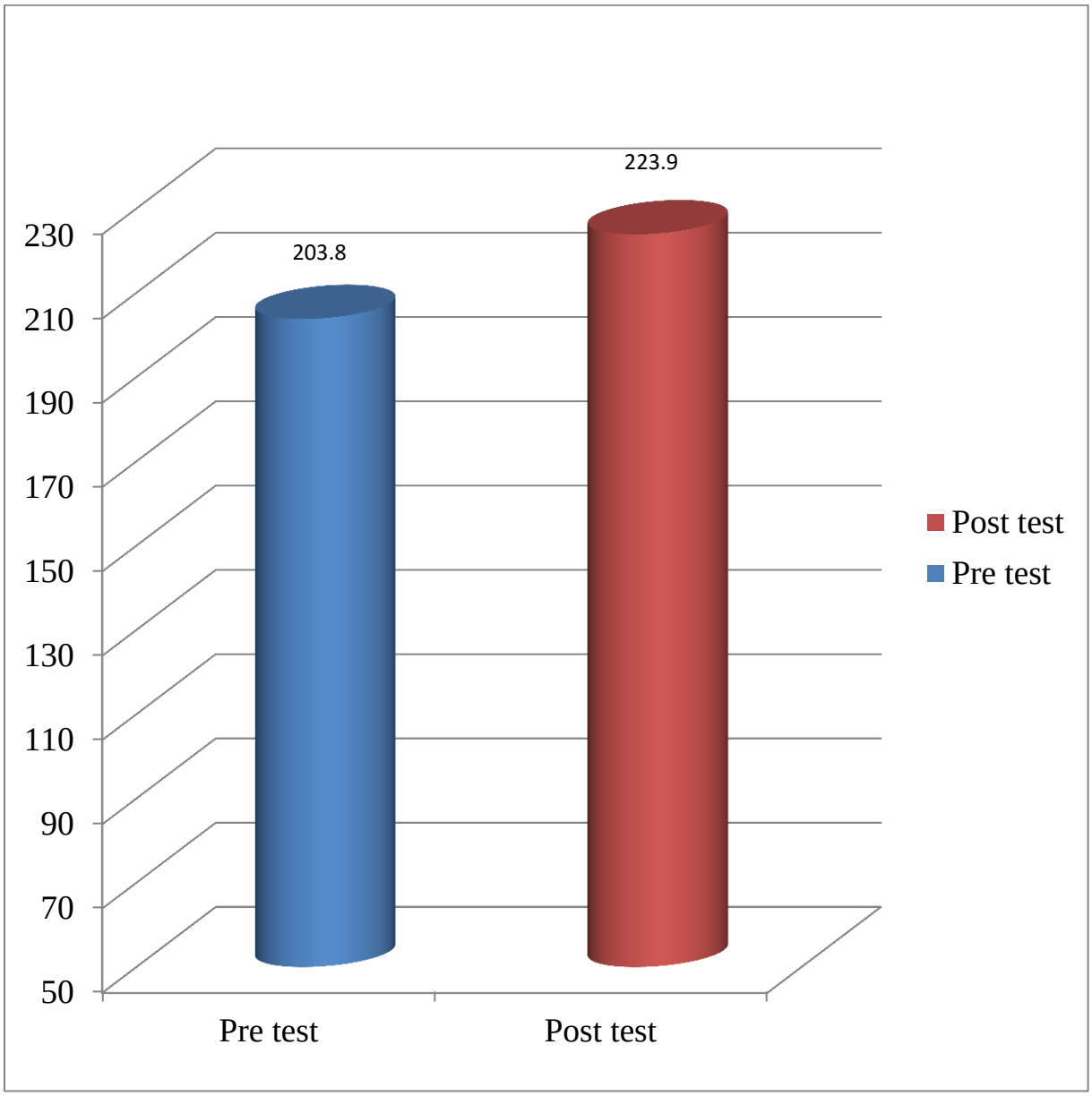


TABLE - II

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP B (EXPERIMENTAL GROUP)

The mean values, mean differences, standard deviation and paired‘t’ values of six minute walk test for Group B.

S.NO	GROUP B	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	‘t’ VALUE
1.	PRE-TEST	203.9	3.5	55.80	47.288
2.	POST-TEST	259.7	3.1		

Using paired “t” test with 5 % as level of significance, the calculated “t” value 47.22 is greater than the table “t” value 2.15. This test showed that there is significant effect of supervised moderate intensity exercise with forced expiratory technique on six minute walk test in patients who have underwent coronary artery bypass graft surgery.

GRAPH – II

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP B

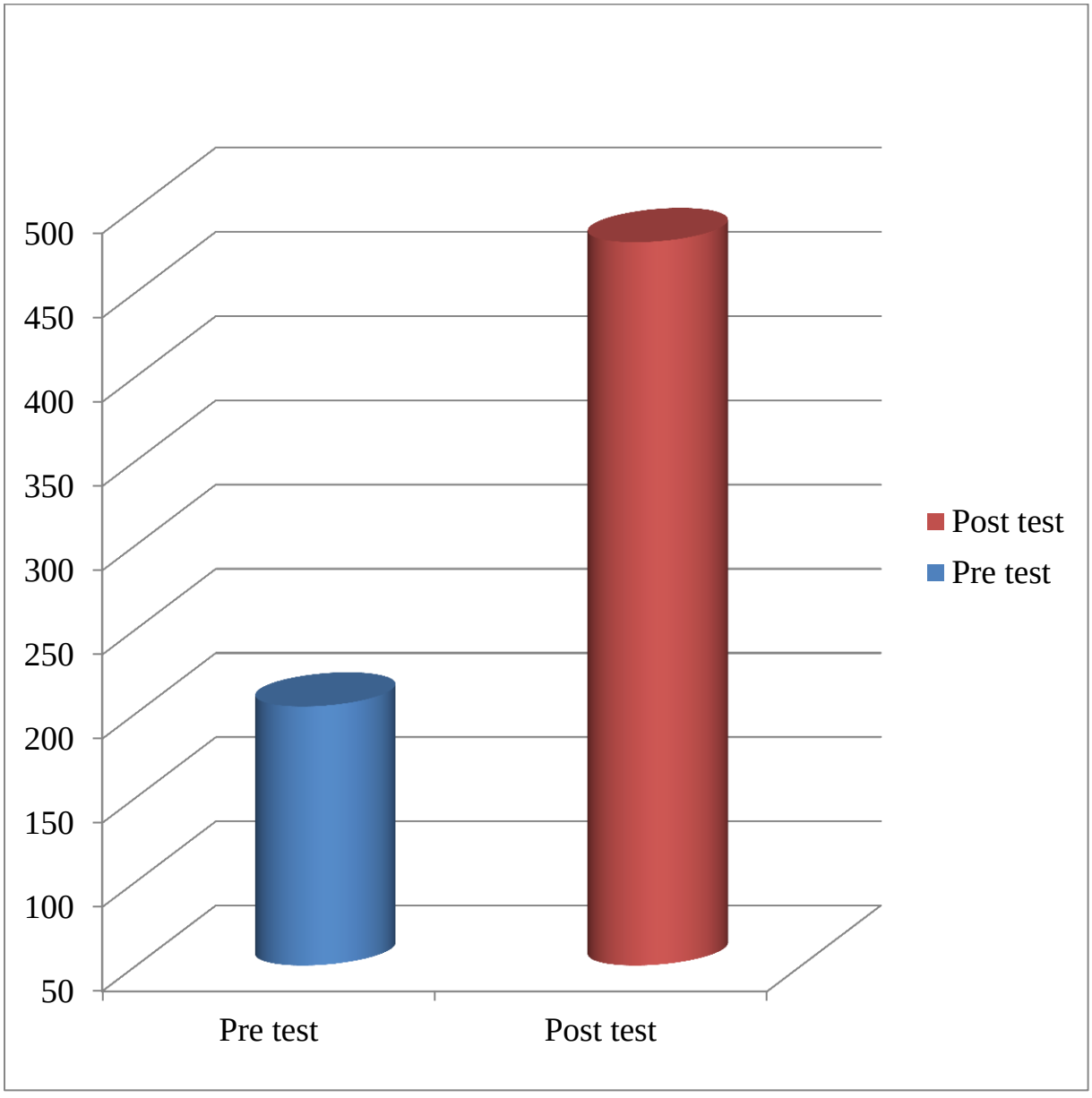


TABLE – III

SIX MINUTE WALK TEST

UNPAIRED 't' TEST-POST VALUES OF GROUP A AND B

The mean values, mean differences, standard deviation and unpaired 't' values of six minute walk test for post values of group A and B.

S.NO	GROUP	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	GROUP A	223.9	3.2	35.80	31.12
2.	GROUP B	259.7	3.1		

Using un-paired "t" test with 5% as level of significance, the calculated "t" value 31.12, which is greater than the tabulated "t" value 2.048. This shows that there is significance difference between the effect of conventional therapy and supervised moderate intensity exercise with forced expiratory technique in six minute walk test for patients who have underwent coronary artery bypass graft.

GRAPH – III

COMPARISION OF POST TREATMENT VALUES OF GROUP A & B

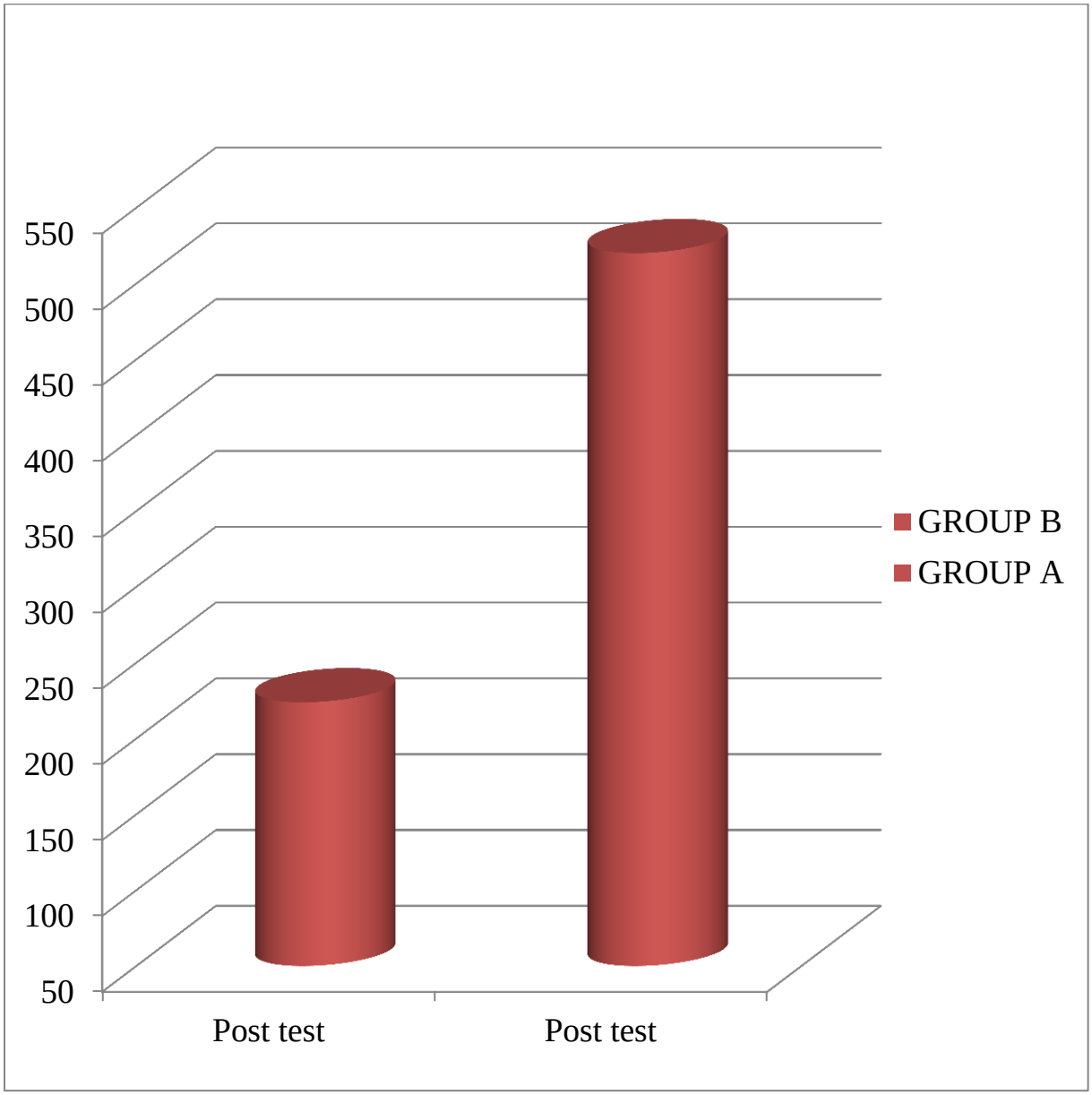


TABLE – 1V

SF-36 QUESTIONNAIRE

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP A

The mean values, mean differences, standard deviation and paired 't' values of SF-36 questionnaire for Group A.

S.NO	GROUP A	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	45.1	2.6	9.7	9.95
2.	POST-TEST	54.9	2.5		

Using paired "t" test with 5% as level of significance, the calculated "t" value 9.95 which is greater than the table "t" value 2.15. This test showed that there is significant effect of conventional therapy in SF-36 questionnaire for patients who have underwent coronary artery bypass graft surgery.

GRAPH – IV

SF-36 QUESTIONNAIRE

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP A

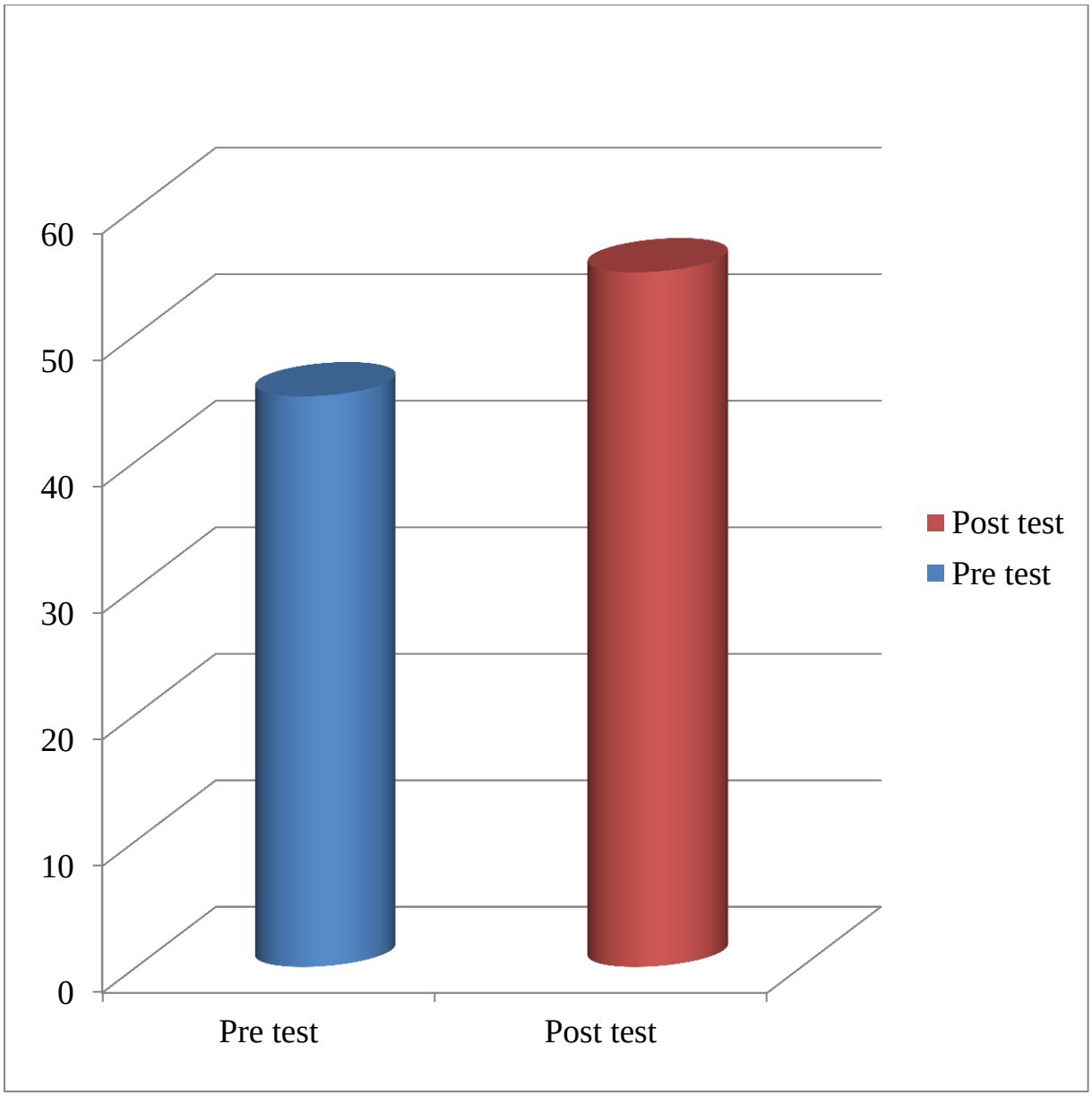


TABLE - V

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP B

The mean values, mean differences, standard deviation and paired 't' values of sf-36 questionnaire for Group B.

S.NO	GROUP B	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	44.9	2.5	14.13	13.81
2.	POST-TEST	59.3	2.8		

Using paired "t" test with 5 % as level of significance, the calculated "t" value 13.81 is greater than the table "t" value 2.15. This test showed that there is significant effect of supervised moderate intensity exercise with forced expiratory technique on SF-36 questionnaire in patients who have underwent coronary artery bypass graft surgery.

GRAPH – V

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP B

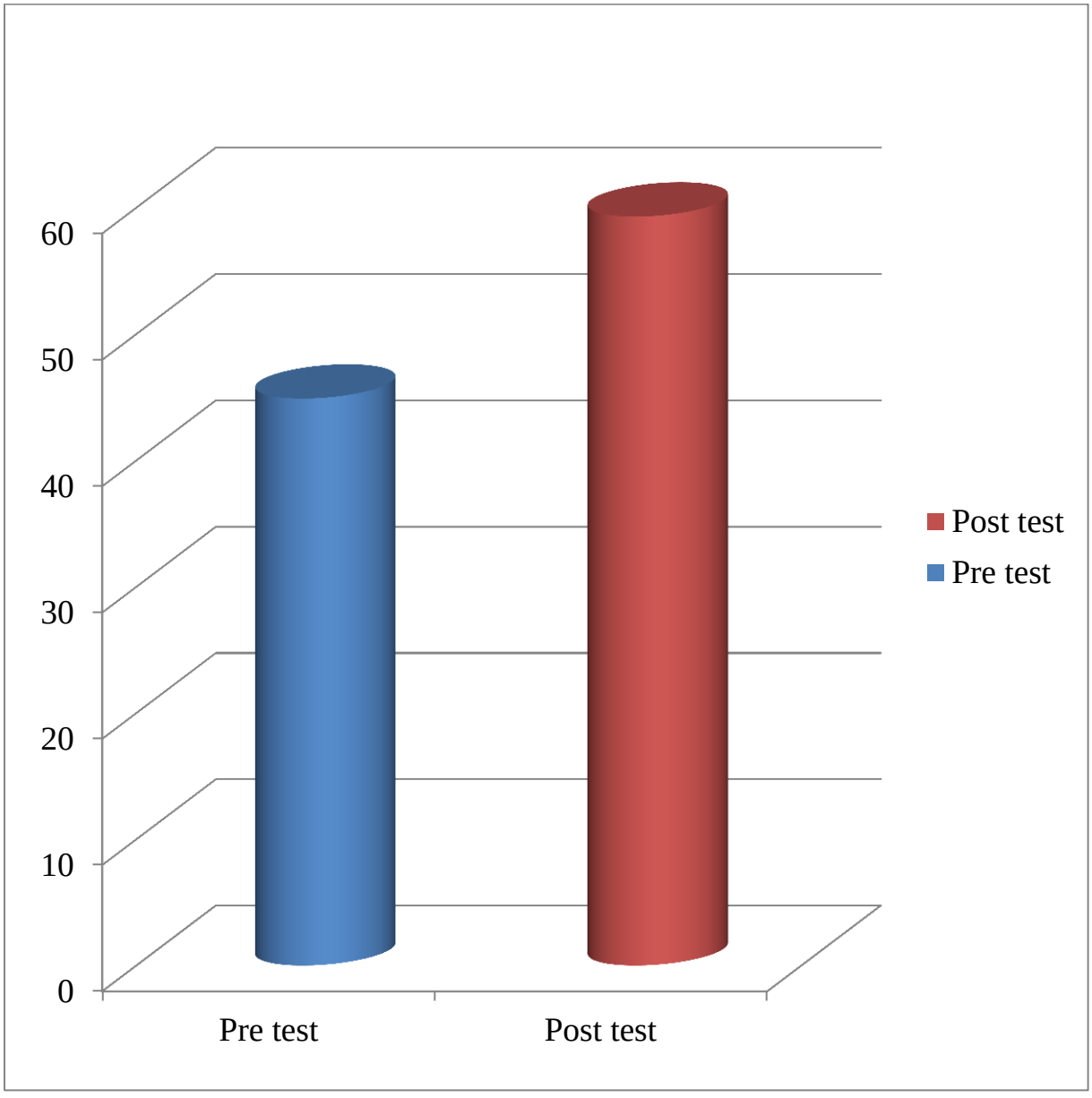


TABLE – VI

UNPAIRED 't' TEST-POST VALUES OF GROUP A AND B

The mean values, mean differences, standard deviation and unpaired 't' values of SF-36 questionnaire for post values of group A and B.

S.NO	GROUP	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	GROUP A	54.9	2.5	4.40	4.53
2.	GROUP B	59..3	2.8		

Using un-paired "t" test with 5% as level of significance, the calculated "t" value 4.53, which is greater than the tabulated "t" value 2.048. This shows that there is significance difference between the effect of conventional therapy and supervised moderate intensity exercise with forced expiratory technique in SF-36 questionnaire for patients who have underwent coronary artery bypass graft.

GRAPH – VI

COMPARISION OF POST TREATMENT VALUES OF GROUP A & B

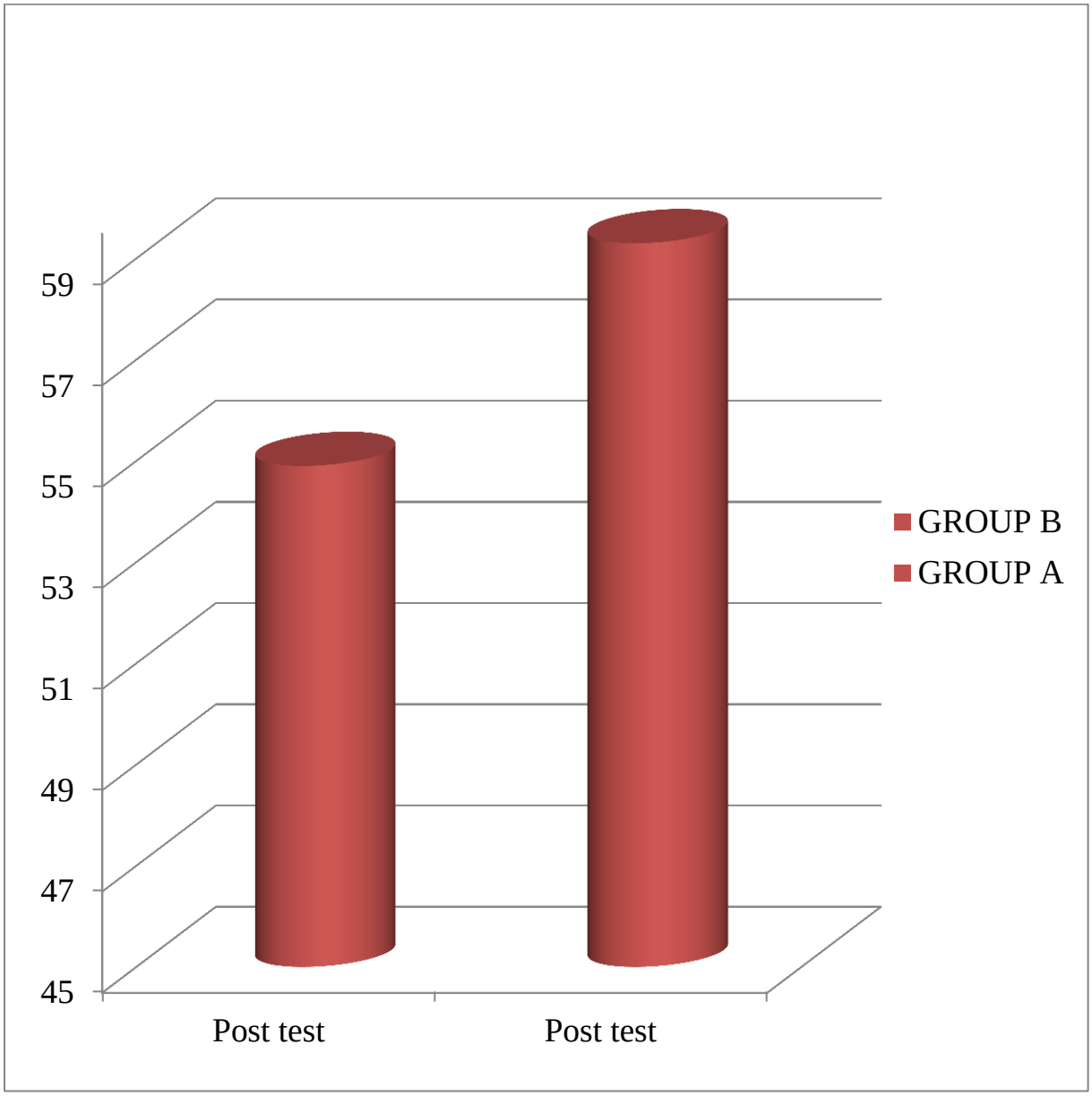


TABLE-VII

PEAK EXPIRATORY FLOW RATE

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP A (EXPERMENTIAL GROUP)

S.NO	GROUP B	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	421.00	61.89	18.00	13.0767
2.	POST-TEST	439.00	58.66		

Using paired "t" test with 5% as level of significance, the calculated "t" value 13.07 which is greater than the table "t" value 2.15. This test showed that there is significant effect of conventional therapy in peak expiratory flow rate for patients who have underwent coronary artery bypass graft surgery.

GRAPH-VII

COMPARISION OF PRE AND POST VALUES OF GROUP A

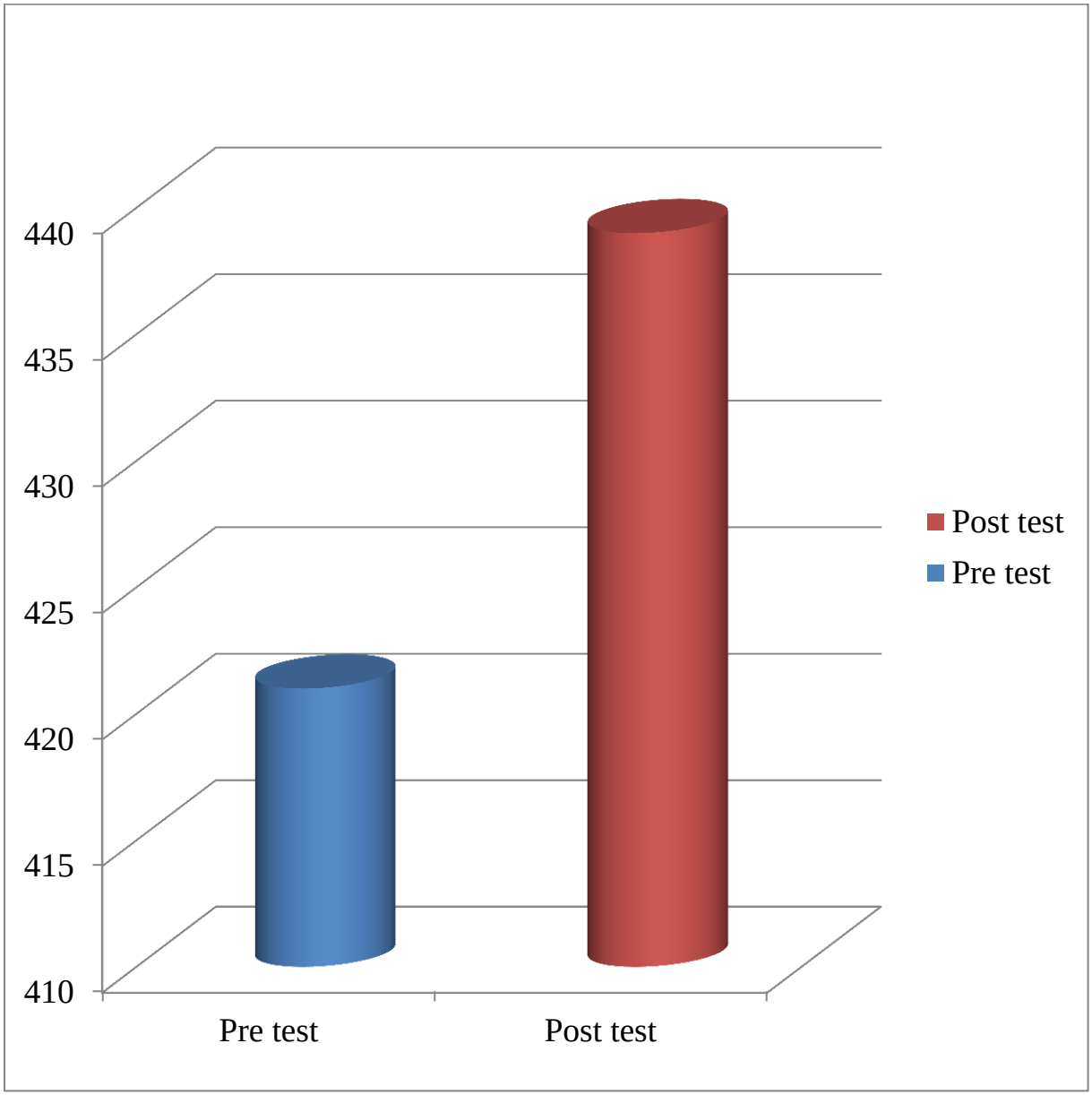


TABLE VIII

COMPARISION OF PRE AND POST TREATMENT VALUES OF GROUP - B

The mean values, mean differences, standard deviation and paired 't' values of peak expiratory flow rate for Group B.

S.NO	GROUP B	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	425.00	64.36	21.50	14.333
2.	POST-TEST	446.50	58.96		

Using paired "t" test with 5 % as level of significance, the calculated "t" value 14.33 is greater than the table "t" value 2.15. This test showed that there is significant effect of supervised moderate intensity exercise with forced expiratory technique on SF-36 questionnaire in patients who have underwent coronary artery bypass graft surgery.

GRAPH VIII

COMPARISION OF PRE AND POST VALUES OF GROUP B

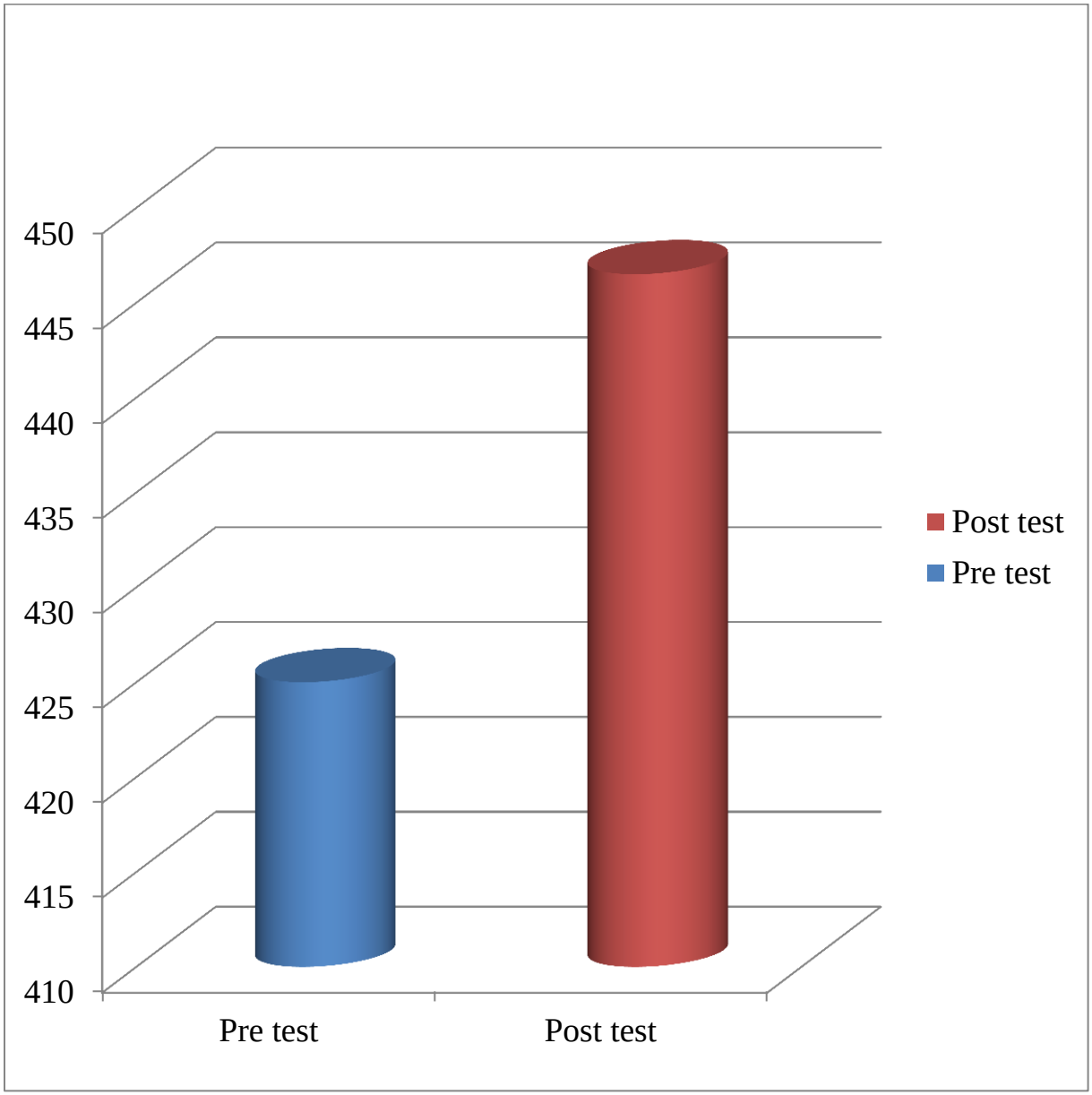


TABLE –IX

COMPARISION OF POST TEST VALUES OF GROUP A AND GROUP B

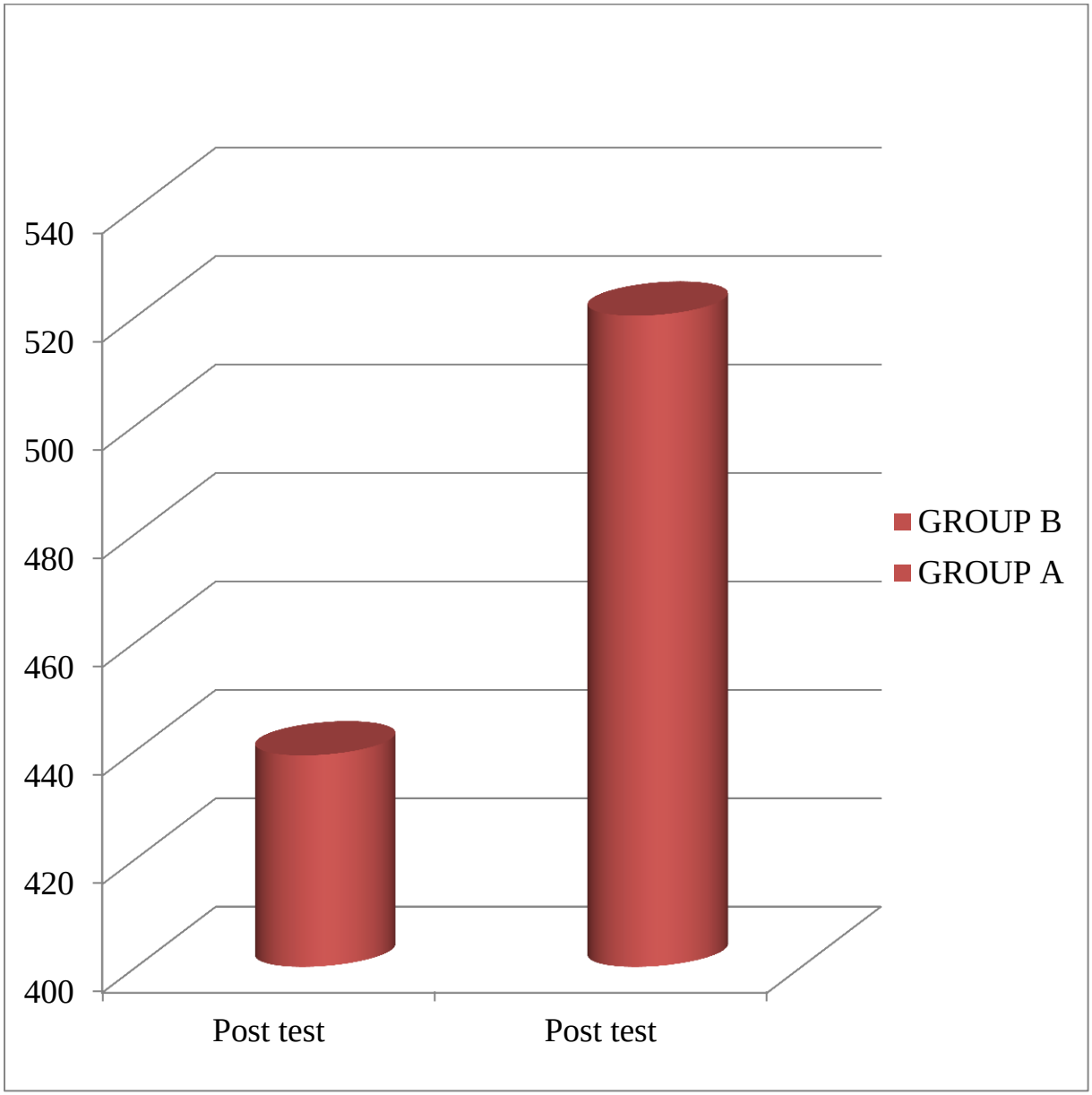
The mean values, mean differences, standard deviation and unpaired 't' values of peak expiratory flow rate for post values of group A and B.

S.NO	GROUP B	MEAN	STANDARD DEVIATION	MEAN DIFFERENCE	't' VALUE
1.	PRE-TEST	439.00	58.66	40.60	8.488
2.	POST-TEST	446.50	58.96		

Using un-paired "t" test with 5% as level of significance, the calculated "t" value 8.488, which is greater than the tabulated "t" value 2.048. This shows that there is no significance difference between the effect of conventional therapy and supervised moderate intensity exercise with forced expiratory technique in peak expiratory flow rate for patients who have underwent coronary artery bypass graft.

GRAPH – IX

POST TEST VALUES OF GROUP A & B



V RESULTS

For this study, 30 subjects who have underwent coronary artery bypass surgery were selected according to inclusion and exclusion criteria and randomly divided into two groups with 15 subjects in each group (group A – control group & group B- experimental group). Treatment duration was for 4 months. Age group of the participants varies from 45years to 55 years. The demographic representations of the groups are given in table I to IX.

The Paired‘t’ test analyses for the pre-test and post-test variable six minute walk test for measuring the endurance capacity of the Group A and Group B patients who have underwent coronary artery bypass graft which was shown in table I and II. Both the groups show significant differences in the pre-test and post-test values. The ‘t’ value for the Group A is 18.14 and the ‘t’ value for the Group B is 47.28.

The un-paired ‘t’ test analysis for the post test variables of both group for six minute walk test in patients who have underwent coronary artery bypass graft is shown in the table III. There was significant difference shown between the Groups. Subjects in Group A showed greater improvements than that of Group B. The unpaired ‘t’ value for the post test variables for both groups is 31.12.

The Paired ‘t’ test analyses for the pre-test and post-test variable for the SF-36 questionnaire for measuring quality of life in patients who have underwent coronary artery bypass graft which was shown in table IV and V. Both the groups show significant differences in the pre-test and post-test values. The ‘t’ value for the Group A is 9.95, the ‘t’ value for the Group B is 13.81

. The unpaired ‘t’ test analysis for the post test variables for the both group for SF-36 questionnaire in patients who have underwent coronary artery bypass graft is shown in the table VI. There was significant difference shown between the Groups. Subjects in Group A showed greater improvements than that of Group B. The ‘t’ value for the post test variables for both groups is 4.53.

The Paired ‘t’ test analyses for the pre-test and post-test variable for the peak expiratory flow rate for measuring endurance capacity in patients who have underwent coronary artery bypass graft which was shown in table VII and VIII. Both the groups show significant differences in the pre-test and post-test values. The ‘t’ value for the Group A is 13.07, the ‘t’ value for the Group B is 14.33.

. The unpaired ‘t’ test analysis for the post test variables for the both group for peak expiratory flow rate in patients who have underwent coronary artery bypass graft is shown in the table IX. There was no significant difference shown

between the Groups. Subjects in Group A showed improvements same as that of Group B. The ‘t’ value for the post test variables for both groups is 8.488.

V. DISCUSSION

The purpose of this study is to see the effect of supervised moderate intensity exercise program with forced expiratory technique to improve the endurance capacity and quality of life in patients who have underwent Coronary Bypass Graft surgery. In this study 30 patients who were reffered from department of cardiology were selected for this study all the subjects were divided into two equal groups,15 subjects in each groups. Group A subjects were given conventional exercise therapy. Group B subjects were given supervised moderate intensity exercise with forced expiratory technique.

Coronary artery disease, also known as ischemic heart disease, is the leading killer of men and women worldwide. In 2004, coronary artery disease was responsible for 7.2 million death, or 12.2% of all deaths globally and 5.8% of all years of life lost (World Health Organization 2008). The disease is highly prevalent: at any given time, 54 million people in the world suffer from angina pectoris (the characteristic chest pain of ischemic heart disease), and 23.2 million people experience moderate to severe disability as a result of ischemic heart disease 2008). Thirty-day mortality after an acute heart attack is extremely high at 33%; even in a hospital with a coronary care unit where advanced care options are available, mortality is still 7%. Approximately 4% of patients who survive initial hospitalization die in the first year following a heart attack (Antman et al. 2004).

Congestive heart failure, the end stage of many heart diseases, carries a 1-year mortality rate as high as 40%. (Sujatha K. Bhatia 2010).

Viswanathan mohan et al., 2001 concluded that there was a higher prevelance of coronary artery disease among the urban south Indian population. The coronary artery disease patients had a greater survival benefit by means of coronary artery bypass graft surgery. (Robert H jones et al., 1996)

According to the American Heart Association, coronary artery bypass graft surgeries are among the most commonly performed major operations. CABG surgery is advised for selected groups of patients with significant narrowing's and blockages of the heart arteries (coronary artery disease). CABG surgery creates new routes around narrowed and blocked arteries, allowing sufficient blood flow to deliver oxygen and nutrients to the heart muscle. With the growing number of patients undergoing CABG, the concept of early mobilization has been prioritized. Since cardiac rehabilitation is a phasic procedure, the early mobilization of the patient results in rapid progression to second phase of cardiac rehabilitation, reducing the length of hospital stay. Early mobilization also comparatively reduces the incidence and intensity of post-operative pulmonary complications, which aids faster recovery.

Cardiac rehabilitation program was effective in reducing cardiac mortality by 20- 26% compared to standard medical treatment (Taylor R S et al., 2004).the

functional capacity has been showed to be a best predictor for increasing the several rate in coronary artery bypass graft subjects (Froslicher V et al., 2002). The quality of life was improved in the subjects who had underwent cardiac rehabilitation as an individual program considering all the principles of training (modes, frequency, intensity, duration). Exercise intensity was an important element in the exercise training (M C Ardle katch & katch 2006)

The most common physiotherapy treatments used after an coronary artery bypass surgery were mobilization (94% of hospitals), range of motion exercises (79%), deep breathing and/or cough (77%), cardiovascular exercise (42%), and incentive spirometry (40%) (Stephanie R Filbay et al., 2011).

In conventional therapy, first day after surgery patients were made to sit with assistance. On second day patients were asked to walk 10m for two times in a day. On third day 30m walking was encouraged. On fourth day same intensity of exercises are given along with ascending and descending the stairs. And later on patients in group A were asked to walk in the room and the ward. All the exercises for group A were designed at a comfortable rate of perceived exertion. For supervised moderate exercise therapy group, on day one patients were asked to walk on spot for 1min for 3 repetitions. On day two they were asked to walk 3 circuit training sessions and covered at least 100m in the morning session and in the evening 5 min walk. Next day a distance of 2.5 is additional included and till

discharge a total of 10 min walking program is given. And a rate of perceived exertion of 3to 4 on a10 point scale is maintained for all patients in group B. In this group breathing exercises twice a day were also included in the regimen. All these exercises were given in the presence of a qualified physiotherapist only.

The forced expiratory technique is a valuable technique (van der Schans 1997) which is effective at clearing sputum from the larger airways. Forced expiratory technique is an integral component of other airway clearance techniques e.g. the active cycle of breathing technique (ACBT), and it may be more appropriate than the use of directed coughing in patients with unstable airways. Huffing has been found to be more effective in the upright position (Badr et al 2002). The limited available evidence does not seem to support using the forced expiratory technique as a solitary treatment..

The six minute walk test was a good predictor of the functional capacity in post-operative cardiac subjects (Claudia Fiorina et al., 2007). The functional capacity of the coronary artery bypass graft subjects was evaluated with six minute walk test. There was an improvement in six minute walk distance in patients who undergone supervised moderate intensity exercise training (Ramin Shalani 2010). Thompson et.al, in their study on exercise and physical activity in prevention and treatment of cardiovascular diseases concluded that physiological function improves the quality of life in patients with CVD. Despite the emotional trauma

post surgically, most of the patients tend to be improved in their subjective health even prior to outpatient cardiac rehabilitation. This is because the surgery itself corrects the anatomical disturbances where by the physiological vascular changes are brought about resulting to be symptom free aiding the psychological wellbeing though exercise plays a role in enhancing the psychological status and mental wellbeing.

Based on the above consideration exercise prescription for post-operative coronary artery bypass graft subjects were mainly based on mode of exercise. Supervised moderate intensity training with forced expiratory technique improved the endurance capacity and quality of life in post-operative coronary artery bypass graft subjects. Thus supervised moderate intensity exercise with forced expiratory technique is beneficial than conventional exercise therapy in subjects who underwent coronary artery bypass graft surgery.

VI. SUMMARY

The purpose of the study was to find out the effect of supervised moderate intensity exercise with forced expiratory technique in patients who have underwent coronary artery bypass graft

30 patients who have underwent coronary artery bypass graft, who fulfilled the pre-determined inclusion and exclusion criteria were selected and divided into two groups, 15 patients in each group. Group A underwent conventional therapy and group B underwent supervised moderate intensity exercise with forced expiratory technique.

Outcome was measured using the operational tools before and after the 4 months of interventions. The six minute walk test was calculated with the distance walked by the subjects, peak expiratory flow rate was measured with peak flow meter and SF-36 questionnaire was calculated from the scores given in the questionnaire.

Student “t” test was used to find out the difference between the pre-test outcomes as well as the difference between the two groups. Based on the statistical analysis, group B showed greater significant difference in six minute walk test, peak expiratory flow rate and SF-36 questionnaire.

CONCLUSION

There is a significant improvement of six minute walk test, peak expiratory flow rate and SF – 36 Questionnaire in both the groups. But this study concludes that there is a greater significant difference in group B than group A.

So this study concludes that there is a marked increase in significant difference in group B, where subjects were given supervised moderate intensity exercise with forced expiratory technique than the subjects in group A, who were given conventional therapy.

VII. LIMITATIONS & RECOMMENDATIONS

LIMITATIONS

- The sample size of this study was small.
- Influence of drug, climate and psychological conditions cannot be controlled.
- Only subjects with coronary artery bypass graft were taken for the study.
- Psychological status of the subjects was not evaluated.

RECOMMENDATIONS

- The study can be done with large samples.
- Increased age group can be considered.
- The VO_2 max and heart rate recovery can also be measured.
- The supervised minimal intensity exercise training can be compared with other training.
- The patients who underwent treatment with percutaneous trans-luminal angioplasty, stent placement or other interventions for coronary artery disease can be included for the future study.

BIBILIOGRAPHY

1. Hirschhorn AD, Richards D, Mungovan SF, Morris NR, Adams L. Supervised moderate intensity exercise improves distance walked at hospital discharge following coronary artery bypass graft surgery-a randomised controlled trial. Heart Lung Circ. 2008;17(2):129-38
2. Joliffe JA,Ress K, et al. Exercise based rehabilitation for coronary heart disease. Chochrane database systemic review.2001:1
3. Klatskey AL,Armstrom MA,Sidney S. The risk of hospitalization for ischaemic heart disease among asian Americans in northen California. Am J public health. 1994; 84 (10):1672-5.
4. Enas EZ,Yusuf S,Mehta J. Prevalence of coronary artery disease in Asian Indians. Am J cardiology. 1992; 70(9):945-9.
5. Chadha SL,Radhakrishnan S, Ramchandran K,Kaul U,Gopinath N. Epidemiological study of coronary heart disease in urban population of delhi. Indian J Med Res. 1990; 92:424-304
6. Rihal CS, Raco DL, Gersh BJ, Yusuf S. Indications for coronary artery bypass surgery and percutaneous coronary intervention in chronic stable angina: review of the evidence and methodological considerations. Circulation. 2003; 108 (20):2439-45. 8
7. Jennifer A Pryor, S Ammani Prasad. Physiotherapy for respiratory and cardiac problems.4thedition; 2008.
8. Hillegass and sudoskey. Essentials of cardiopulmonary physical therapy.3rd edition;2011.
9. Leon AS,Casal D,Jacobs D. Effect of 21000 Kcal per week of walking and stair climbing on physical fitness and risk factors for coronary heart disease. J cardio-pulmonary rehab.1996; 16(3):183-192.

10.. Douma WR, van der Mark TW, Folgering HT, Kort E, Kerstjens HA, koeter GH, Postma DS. Mini wright peak flow meters are reliable after 5 years use. Dutch CNSLD Study Group. Europeans Respiratory J. 1997 Feb; 10(2):457-9..

11. Dekker FW, Schrier AC, Strek PJ, Dijkman JH; Validity of peak expiratory flow measurements in assessing reversibility of airflow obstruction thorax 1992; 47(3): 162-66.

12. Robert h jones - Long-term survival benefits of coronary artery bypass grafting and percutaneous transluminal angioplasty in patients with coronary artery disease. 1996 ; : https://doi.org/10.1016/S0022-5223(96)70378

13. Takashi hirotani, Tadashi kameda, Takayuki kumamota, Shogo shirota; Coronary - Coronary Bypass Using the Internal Thoracic Artery: A Sparing Procedure of the Arterial Conduit 2010 .

14. Susan c Jenkins, Susan A Soutar, Julia M Loukota, Lorna C Johnson(1989): [Physiotherapy after coronary artery surgery: are breathing exercises necessary, (Thorax 1989;44:634-639)]

15. Brasher PA, McClelland KH, Denehy L and Story I (2003):
[Does removal of deep breathing exercises from a physiotherapy program including pre-operative education and early mobilisation after cardiac surgery alter patient outcomes, (Australian Journal of Physiotherapy 49: 165-173)]

16. E. Westerdahl(2015):**[**Optimal technique for deep breathing exercises after cardiac surgery, (Minerva Anestesiol 2015;81:678-83)]

17. Dr. Riaz Fatima (2017):[Pre and post operative physiotherapy for patients after open-heart surgery, European International Journal of Science and Technology, Vol. 6 No. 2, March 2017]

18. Paul l enright and duane l Sherrill, (1998):[reference equations for the six-minute walk in healthy adults,(am j respir crit care med 1998;158:1384-1387)]

19. Martha Gulati, MD; Paul Kligfield, MD, FAHA, Jonathan Myers, phd; Mark A. Williams, PhD,(2007): [Assessment of Functional Capacity in Clinical and Research Settings Assessment of Functional Capacity in Clinical and Research Settings, (American Heart Association Circulation, 2007;116:329-343.)]

20. Ellen Collins,RN, PhD; Gerald Fletcher, MD, FAHA,(2007):[A scientific statement from the American heart association clinical cardiology and the council on cardiovascular nursing, circulation AHA, 106.184461-2017.]

21. Mark A william, maryam Hussain Hamazah, Dr. Leith salieh aboud(2015): [six minute walk distance after coronary artery bypass graft surgery: comparative study (IOSR journal of nursing and health science, 2320-1940 volume 5, issue 3 ver. III, pp 116-123)]

22. American Heart Association (2000): [measuring and improving quality of care,(CIR.101:1483-1493.12.1483)]

23. Linda J Thomson Mangnall, Kirstin H McClelland (2014**):** [Does removal of deep breathing exercises from a physiotherapy program including pre-operative education and early mobilisation after cardiac surgery alter patient outcomes?, (Australian Journal of Physiotherapy 2003 Vol.49)]

24. Cristina Opasich, Stefania De Feo,: Distance Walked in the 6-Minute Test Soon After Cardiac Surgery* Toward an Efficient Use in the Individual Patient. (CHEST 2004; 126:1796–1801)

25. Charlotte Urell, Elisabeth Westerdahl, Hans Hedenstr: Lung Function before and Two Days after Open-Heart Surgery. Critical Care Research and Practice Volume 2012, Article ID 291628, 7 pages.

26. GravleeGP,DavisRF,Kurusz M, and Utley JR. In: Cardiopulmonary Bypass: Principles and Practice ed 2 Oster JB, Sladen RN, Berkowitz DE. Chap 18-Cardiopulmonary bypass and the lung.lww, 2007ISBN 10: 0781768152 .
27. Hannan EL, Racz MJ, Walford G, Ryan TJ, Isom OW, Bennett E, Jones RH. Predictors of readmission for complications of coronary artery bypass graft surgery. JAMA 2003; 290: 773-780
28. Jenkins SC, Soutar SA, Loukota JM, Johnson LC, Moxham J. Physiotherapy after coronary artery surgery: are breathing exercises necessary? Thorax. 1989;44(8):634-9.
29. Matte P, Jacquet L, Van Dyck M, Goenen M. Effects of convencional physiotherapy, continuous positive airway pressure and non-invasive ventilatory support with bilevel positive airway pressure after coronary artery bypass grafting. Acta Anaesthesiol Scand. 2000;44(1):75-81.
30. Milgrom LB, Brooks JA, Qi R, Bunnell K, Wuestfeld S, Beckman D. Pain levels experienced with activities after cardiac surgery. Am J Crit Care. 2004;13(2):11625.
31. Patman, S, D: Physiotherapy following cardiac surgery: Is it necessary during the intubation period. Australian journal of physiotherapy, pp. 7-16.
32. Wynne R, Botti M. Postoperative pulmonary dysfunction in adults after cardiac surgery with cardiopulmonary bypass: clinical significance and implications for practice. Am J Crit Care. 2004 Sep;13(5):384-93.

APPENDIX - I

CARDIOPULMONARY ASSESSMENT

DEMOGRAPHIC DATA

Name:

Age:

Sex:

Occupation:

Height:

Weight:

Date of admission:

Date of surgery:

Date of assessment:

Present complaints:

HISTORY

Past medical history:

Present medical history:

Drug history:

Social history:

Associated problems:

SUBJECTIVE ASSESSMENT

Breathlessness: Rate of perceived exertion (RPE)

Cough:

Sputum:

- Colour
- Quality
- Odour
- Consistency

Chest pain:

- Character
- Location
- Duration
- Behaviour

Wheeze:

OBJECTIVE ASSESSMENT

ON OBSERVATION:

Built:

Chest:

- Shape
- Symmetry
- Breathing pattern
- Respiratory rate

Chest movements:

Intercostal retraction:

Periphery/Extremities:

- Clubbing
- Cyanosis
- Oedema

Respiratory distress:

Type of respiration:

Vital sign:

- Blood pressure
- Respiratory rate
- Heart rate
- Temperature
- Use of accessory muscles
- Vocal fremitus

ON AUSCULTATION

Lung sound:

Breathe sound:

Heart sound:

ON PALPATION

Tracheal deviation:

Chest expansion:

- Axillary level
- Nipple level

- Xiphoid level

Tenderness:

Oedema:

PEAK EXPIRATORY FLOW RATE:

INVESTIGATION

X ray:

ECG:

Echo-cardiogram:

ABG analysis:

Blood test:

DIAGNOSIS

GOALS

MEANS

APPENDIX-II

PEAK EXPIRATORY FLOW METER (PEFR)

The peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR) is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. It measures the airflow through the bronchi and thus the degree of obstruction in the airways.

PROCEDURE:

- Ask the patient to sit or to stand up straight.
- Make sure the indicator is at the bottom of the meter.
- Ask the patient to take deep breath filling patients lungs completely.
- Place the mouthpiece in patient’s mouth, lightly bit with patients teeth and close the lips on it.
- Blast the air out as hard and fast as possible in a single blow.
- Record the number that appears on the meter.
- Repeat these steps three times.
- Record the highest of these three readings of the patient. This reading is the peak expiratory flow.

APPENDIX- III

SIX MINUTE WALK TEST

According to the American Thoracic Society Guidelines;

- "The 6MWT is easy to administer, better tolerated, and more reflective of activities of daily living than the other walk tests".
- The 6MWT is a practical simple test that requires a 100-ft hallway but no exercise equipment or advanced training for technicians.
- Walking is an activity performed daily by all but the most severely impaired patients.
- This test measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes (the 6MWD).
- It evaluates the global and integrated responses of all the systems involved during exercise, including the pulmonary and cardiovascular systems, systemic circulation, peripheral circulation, blood, neuromuscular units, and muscle metabolism.

PROCEDURE:

- Set the timer to 6 minutes.
- Prepare any other materials (cones, worksheets, chair etc.) and go to the test area.

- Start the timer as soon as the participant starts walking.
- Keep track of the laps by marking on the worksheet.
- Record the number of laps on the counter.
- Record the additional distance covered from the final partial lap.
- Calculate the total distance walked and round to the nearest meter.
- Record this in the participant's source data
- Congratulate the participant on a good effort and offer them some water.

Dos and Don'ts:

- Do focus and avoid losing count of the laps.
- Do ensure the area is free from obstacles/trip hazards before performing the test.
- Don't walk alongside the participant. Stay near the starting line during the test.
- Don't allow any observers (family members etc.) to encourage or walk alongside the participant.
- Don't use words or body language to speed up the participant. They should set their own pace.

APPENDIX- IV

SHORT FORM – 36 QUESTIONNAIRES

Name: _____Ref. Dr: _____ Date: _____

ID#: _____ Age: _____ Gender: M / F

Please answer the 36 questions of the Health Survey completely, honestly, and without interruptions.

GENERAL HEALTH:

a. In general, would you say your health is:
    - Excellent
    - Very Good
    - Good
    - Fair
    - Poor

b. Compared to one year ago, how would you rate your health in general now?
    - Much better now than one year ago
    - Somewhat better now than one year ago
    - About the same
    - Somewhat worse now than one year ago
    - Much worse than one year ago

LIMITATIONS OF ACTIVITIES:

a. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

b. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.

   Yes, Limited a lot Yes, Limited a Little No, Not Limited at all

c. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

d. Lifting or carrying groceries

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

e. Climbing several flights of stairs

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

f. Climbing one flight of stairs

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

g. Bending, kneeling, or stooping

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

h. Walking more than a mile

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

i. Walking several blocks

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

j. Walking one block

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

k. Bathing or dressing yourself

   Yes, Limited a Lot Yes, Limited a Little No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

a. Cut down the amount of time you spent on work or other activities

   Yes No

b. Accomplished less than you would like

   Yes No

c. Were limited in the kind of work or other activities

   Yes No

d. Had difficulty performing the work or other activities (for example, it took extra effort)

   Yes No

EMOTIONAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

a. Cut down the amount of time you spent on work or other activities

   Yes No

b. Accomplished less than you would like

   Yes No

c. Didn't do work or other activities as carefully as usual

   Yes No

SOCIAL ACTIVITIES:

a. Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

   Not at all slightly moderately Severe Very Severe

PAIN:

a. How much bodily pain have you had during the past 4 weeks?

   None Very Mild Mild Moderate Severe Very Severe

b. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all A little bit Moderately Quite a bit extremely

ENERGY AND EMOTIONS:

These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that comes closest to the way you have been feeling.

a. Did you feel full of pep?
   - All of the time
   - Most of the time
   - A good Bit of the Time
   - Some of the time
   - A little bit of the time
   - None of the Time

b. Have you been a very nervous person?
   - All of the time
   - Most of the time
   - A good Bit of the Time
   - Some of the time
   - A little bit of the time
   - None of the Time

c. Have you felt so down in the dumps that nothing could cheer you up?
   - All of the time
   - Most of the time
   - A good Bit of the Time
   - Some of the time

- A little bit of the time
- None of the Time

d. Have you felt calm and peaceful?
    - All of the time
    - Most of the time
    - A good Bit of the Time
    - Some of the time
    - A little bit of the time
    - None of the Time

e. Did you have a lot of energy?
    - All of the time
    - Most of the time
    - A good Bit of the Time
    - Some of the time
    - A little bit of the time
    - None of the Time

f. Have you felt downhearted and blue?
    - All of the time
    - Most of the time
    - A good Bit of the Time
    - Some of the time
    - A little bit of the time
    - None of the Time

g. Did you feel worn out?
    - All of the time
    - Most of the time
    - A good Bit of the Time

- Some of the time
- A little bit of the time
- None of the Time

h. Have you been a happy person?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

i. Did you feel tired?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

SOCIAL ACTIVITIES:

a. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the Time

GENERAL HEALTH:

a. How true or false is each of the following statements for you?
    - I seem to get sick a little easier than other people
    - Definitely true
    - Mostly true
    - Don't know
    - Mostly false
    - Definitely false

b. I am as healthy as anybody I know
    - Definitely true
    - Mostly true
    - Don't know
    - Mostly false
    - Definitely false

c. I expect my health to get worse
    - Definitely true
    - Mostly true
    - Don't know
    - Mostly false
    - Definitely false

d. My health is excellent
    - Definitely true
    - Mostly true
    - Don't know
    - Mostly false

The short form 36 reports the patients preserved quality of life by scores ranging from 36-149, where 149 is the best and 36 is the worst score.

APPENDIX – V

FORCED EXPIRATORY TECHNIQUE

A huff (also called the forced expiration technique [FET] when combined with breathing control) is a manoeuvre used to move secretions, mobilized by thoracic expansion exercises, downstream towards the mouth. It can be used as a stand-alone technique but should always be included in any airway clearance routine. If taught appropriately, the FET is probably the most effective airways clearance technique (van der Schans 1997). It should be taught by a health care professional with experience in teaching this technique.

PROCEDURE:

- The technique is generally taught in sitting.
- Before huffing the patient breathes quietly, at their own pace, for as long as is required.
- When initially taught, the patient is instructed to take a medium breath in and to breathe out with mild to moderate force and extended expiratory flow, with the glottis open. The length of the huff and force of contraction of the muscles of expiration should be altered to optimize clearance of secretions (Pryor & Prasad 2008) by maximizing air flow.

- To facilitate the opening of the glottis, the patient can be taught to perform a huff with a piece of cardboard spirometry tubing (or any tubing of a similar diameter) placed at least four centimetres inside their open mouth.

- Therefore, to move secretions from peripheral airways, it is more effective to commence huffing at low lung volumes and to progress to medium and finally large lung volumes.

APPENDIX – VI

CONSENT FORM

This is to certify that I ……. freely and voluntarily agree to participate in the study "EFFECT OF SUPERVISED MODERATE INTENSITY EXERCISE WITH FORCED EXPIRATORY TECHNIQUE IN IMPROVING ENDURANCE CAPACITY AND QUALITY OF LIFE IN SUBJECTS WITH CORONARY ARTERY BYPASS GRAFT"

I have been explained about the procedures and the risks that would occur during the study.

Participant:

Witness:

Date:

I have explained and defined the procedure to which the subject has consented to participate.

Researcher:

Date: